38. Proposed by O. W. ANTHONY, Mexico, Missouri.

From two points, one on each of the opposite sides of a parallelogram, lines are drawn to the opposite vertices. Through the points of intersection of these lines a line is drawn. Prove that it divides the parallelogram into two equal parts.

CALCULUS.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

18. Proposed by J. M. BANDY, A. M., Principal of High School, Ashboro, North Caolina.

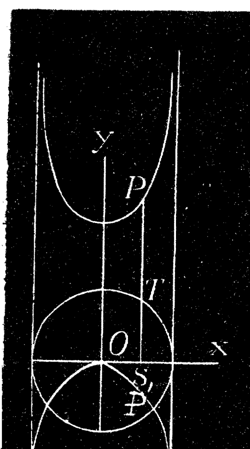
If the ordinate ST of any point T on a circle

$$x^2+y^2=r^2$$

be produced so that $ST.TP=r^2$, prove that the whole area between the locus of P and its asymptotes is double the area of the circle.

III. Solution by ALFRED HUME, C. E., D. Sc., Professor of Mathematics, University of Mississippi, University, Mississippi.

If the ordinate is produced in both directions (upward and downward) there will be two points, P and P_1, located for every point, T, on the circle; and when T has moved over the upper half of the circle, P has traced the upper, and P_1, the lower curve.



x and y being the co-ordinates of P, $ST=\sqrt{(r^2-x^2)}$.

For the upper curve, $TP=y-\sqrt{(r^2-x^2)}$, and the equation is $y_1=\dfrac{2r^2-x^2}{\sqrt{(r^2-x^2)}}$, y_1 being always positive.

For the lower curve, $TP_1=y_1+\sqrt{(r^2-x^2)}$, and the equation is $y_1=\dfrac{x^2}{\sqrt{(r^2-x^2)}}$, y_1 being always negativ.

Therefore the length of $PP_1(=PS+SP_1=y+y_1)$ is $\dfrac{2r^2}{\sqrt{(r^2-x^2)}}$.

Total area between the curves and two common asymptotes $(x=\pm r)$ $=2\displaystyle\int_0^r\frac{2r^2dx}{\sqrt{(r^2-x^2)}}=\left[4r^2\sin^{-1}\frac{x}{r}\right]_0^r=2\pi r^2$.

[The solutions previously published supposed an alteration to be made in the original statement of the problem. Prof. Hume thinks possibly the Proposer had the above in mind. We publish for comparison.—EDITOR.]